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ABSTRACT

This curriculum unit requires students to use science, geography, and language arts skills in studying the weather. Students are asked to report on weather anomalies and are provided with background information, detailed instructions, online resources, and reflection questions. The teacher's guide describes the unit's purpose, correlation to historical and social sciences skills, and how to conduct the lessons, including management and assessment tips. (RJC)

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Schools of California Online Resources for Education (SCORE): Connecting California's Classrooms to the World

Weather Anomalies

9th Grade Lesson by Bill Sears

SCORE
San Berardino County Superintendent of Schools
601 North E. Street
San Bernardino, CA 92410-3093

http://score.rims.k12.ca.us/activity/floods/index.html

1999

SO 031 501

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Weather Anomalies

Teacher Notes

NOAA MEMO

TO: Supervisor, Weather Anomalies Research (WAR) Task Force

FROM: D. James Baker, Administrator, The National Oceanic and Atmospheric Administration (NOAA)

SUBJECT: Attendance at the 23rd Climate Diagnostics and Prediction Workshop

For the year 2005, the National Oceanic and Atmospheric Administration (NOAA) envisions a world in which societal and economic decisions are coupled strongly with a comprehensive understanding of the environment. NOAA provides science, technology and services for the Nation in support of this vision. NOAA's mission is to describe and predict changes in the Earth's environment, and conserve and manage wisely the Nation's coastal and marine resources to ensure sustainable economic opportunities.

I want you, as Supervisor of the WAR Task Force, to put together a Select Scientific Research Team to go to the 23rd Climate Diagnostics and Prediction Workshop to present your latest findings on The Similarities and Differences between the two phenomena- El Niño, La Niña, and Global Warming. This Workshop provides a forum to exchange ideas and viewpoints on a variety of climate topics. The primary objective of the

Workshop is to address research in prediction and diagnostic studies of climate. This focus fits in with the NOAA's vision.

Your task is to make presentations on the: (a) description of the basic mechanisms of weather; (b) description of the basic mechanisms of El Niño, La Niña, and Global Warming; (c) description of the similarities and differences of the three climate anomalies - El Niño, La Niña, and Global Warming; (d) description of the impact of all three anomalies on regional Climate and Weather.

D. James Baker, NOAA Administrator

Weather Anomalies

A Class Room Simulation of a select scientific team from the National Oceanic and Atmospheric Administration (NOAA)

Unusual weather has been reported in the last two years as quoted in: *SCIENCE* , JULY 27, 1998 VOL. 152 NO. 4 "Blowing Hot And Cold, " By J. MADELEINE NASH /BOULDER.

"Even as El Niño helps spawn record heat waves in its final days, its unruly sister--La Niña--is brewing in the Pacific"

El NIÑO, December 1997

- Fewer Atlantic Ocean hurricanes
- Warmer winters in Canada and much of northern U.S.
- Wetter winters in southeastern and southwestern U.S.

- Wildfires in Borneo rain forest
- Smaller harvests in northeastern Brazil
- Greater chance of drought in Indonesia and Australia

LA NIÑA, July 1998

- More Atlantic Ocean hurricanes
- Colder winters in Canada
- Wetter winters in the Pacific Northwest
- Warmer, dryer winters in southeastern and southwestern U.S.
- Lower wheat yields in Argentina
- Torrential rains in Southeast Asia

It seems like the world has been plagued with weird weather lately, why? Let's find out!

YOUR TASK

Your Task in this three week lesson is to be part of a team that will make presentations on the: (a) descriptions of the basic mechanisms of weather; (b) descriptions of the basic mechanisms of El Niño, La Niña, and Global Warming; (c) descriptions of the similarities and differences of the three climate anomalies - El Niño, La Niña, and Global Warming; (d) descriptions of the impact of all three anomalies on regional Climate and Weather.

You will be simulating that you are a member of a select scientific team from the National Oceanic and Atmospheric Administration (NOAA) which envisions a world in which societal and economic decisions will be coupled strongly with a comprehensive understanding of the environment. NOAA provides science, technology and services for the Nation in support of this vision. NOAA's vision is to describe and predict changes in the Earth's environment, and conserve and manage wisely the Nation's coastal and marine resources to ensure sustainable economic opportunities.

To that end D. James Baker, Administrator NOAA, has asked your supervisor (your teacher) to be part of a carefully selected scientific team (you and your class) to make a presentation at the 23 Climate Diagnostics and Prediction Workshop to be held during 7-11 December, 1999 in

Berkeley, CA at the E.O. Lawrence Berkeley National Laboratory. The Workshop is cosponsored by the:(a) Climate Prediction Center, (b) NCEP/NOAA, Washington, D.C.; (c) The Program for Climate Model Diagnosis and Inter comparison, Lawrence Livermore National Laboratory, University of California; and (d) The American Meteorological Society.

The Workshop provides a forum to exchange ideas and viewpoints on a variety of climate topics. The primary objective of the Workshop is to address research in prediction and diagnostic studies of climate. One of this year's focus will be the three phenomena El Niño, La Niña, and Global Warming, your teams specialty.

You will, of course, need to produce the highest quality documentation for your work. You will be using the Internet/World Wide Web (including the online archives of newspapers), as major resources, as well as other electronic and print resources (books, magazine articles) of our library information technology center.

The Process:

Your Group Report and Presentation:
Your supervisor has selected 10 groups of three scientists (36 select scientists), Each group will have 3 or 4 scientists each. The following groups are:

Group I: What is the General Mechanism of Global Weather?

Group II: What are the mechanisms of the three phenomena causing anomalies to general climate?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group III: What is the regional Consequences for the Arctic.

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group IV: What are the regional consequences for North America?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group V: What are the regional consequences for South America?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group VI: What are the regional consequences for Asia?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group VII. What are the regional consequences for Africa?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group VIII: What are the regional consequences for Europe?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group IX. What are the regional consequences for Middle East?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group X. What are the regional consequences for Australia?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group XI. What are the regional consequences for Middle East?

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

All three Scientist will discuss the regional similarities and differences of all three anomalies.

Group XII. What are opposing theories to the general scientific thinking.

Scientist A: El Niño,

Scientist B: La Niña,

Scientist C: Global Warming.

Suggested Resources

1.SITE NAME: USA Today: How the Weather Works

- **URL:** http://www.usatoday.com/weather/wworks0.htm
- **DESCRIPTION:** At this web site you will find graphics and text that examine various weather phenomena.
- **KEYWORDS:** weather, fronts, seasons, wind, jet streams, clouds, fog, rain, humidity, snow, storms, thunderstorm, tornado, hurricane, monsoons.
- **COMMENTS:** Good explanation of basic weather phenomena with backup graphics.
- **READING LEVELS:** Grade 4-12
- **RATING:** 1

2. SITE NAME: WeatherNet

- **URL:**http://cirrus.sprl.umich.edu/wxnet/
- **DESCRIPTION:** Provides access to thousands of forecasts, images, and the Net's largest collection of weather links.
- **KEYWORDS:** forecasts, images, weather links,
- **COMMENTS: Good** source for current weather information.
- **Reading Level:** 4-12
- **Rating:** 1

3. SITE NAME: WW2010 University of Illinois, "The Online Meteorology Guide"

- **URL:** http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/home.rxml
- **DESCRIPTION:** This is a collection of web-based instructional modules that uses multimedia technology and the dynamic capabilities of the web.
- **KEYWORDS:** instructional modules, current weather, atmospheric sciences, colorful diagrams, animations, computer simulations, audio, video
- **COMMENTS:** Good explanation of basic weather phenomena with backup graphics. This database is growing with more relevant information on meteorology and 9-12 curriculum.
- **Reading Level:** The target audience for the Online Meteorology Guide is high school and undergraduate level students.
- **Rating:** 1

4. SITE NAME: An El Niño Theme Page:

- **URL:** http://www.coaps.fsu.edu/lib/enso_sites.html
- **DESCRIPTION:** Good explanation of basic the El Nino phenomena with backup graphics.
- **KEYWORDS:** El Niño, NOAA, PMEL, TAO, tutorial, graphics

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- **COMMENTS:** This is an award winning site maintained by the U.S. Dept of Commerce / NOAA / PMEL / TAO
- **Reading Level:** Grade 4-12
- **Rating:** 1

5. SITE NAME: La-Niña

- **URL:**http://www.kjc.gov.my/ninaupdt.htm
- **Description:**Malaysian Meteorological Service: La-Niña, it's impact on weather in Malaysia and the stage of preparedness for the impending 1998/99 La-Nina. Discusses six significant La-Niña events since 1950.
- **Keywords:**La Niña, Malaysia, southeast Asia/Australia, central equatorial pacific
- **Reading Levels:** 7-12
- **Rating:** 2

6. SITE NAME: Global Warming Primer

- **URL:** http://www.ec.gc.ca/climate/index.html
- **DESCRIPTION:** This global warming primer is part of the Canadian Learning Program's focus on atmospheric change.
- **KEYWORDS:** Canada, Global Warming, Tutorial,
- **COMMENTS:** Very good content, with some nice graphics.
- **Reading Level:** Grade 9-12
- **Rating:** 3

7. SITE NAME: The Environmental Protection Agency's Global Warming Web Site

- **URL:**http://www.epa.gov/reg5oopa/students/global_warming_us.htm
- **DESCRIPTION:** Information pertaining to the science of global warming; current and projected impacts of global warming.
- **KEYWORDS:** climate, climate change, the greenhouse effect, or global warming,
- **COMMENTS:** If you are looking for information on "climate change," "the greenhouse effect," or "global warming, " you've come to the right place.
- **Reading Level:** Grade 9-12 Rating: 1
-

8. SITE NAME: Global Learning and Observations to Benefit the Environment (GLOBE)

- **URL:** http://www.globe.gov/
- **DESCRIPTION:** GLOBE is worldwide network of students, teachers, and scientists working together to study and understand the global environment.
- **KEYWORDS:** network, students, teachers, schools, scientists, education,

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environment

- **COMMENTS:** Students and teachers from over 4000 schools in over 55 countries are working with research scientists to learn more about our planet.
- **Reading Level:** Grade 4-12
- **Rating:** 1

9. SITE NAME: El Nino Bibliographies:

- **URL:** http://www.lib.noaa.gov/edocs/elnino.html
- **DESCRIPTION:** several bibliographies on the topic of El Niño.
- **KEYWORDS:** bibliography, articles, books, magazines, videos, films, web sites, El Niño
- **COMMENTS:** The best bibliography web site on the subject of El Niño.
- **Reading Level: Grade** 9-12

10. SITE NAME: El Niño 1997-1998

- **URL:**http://spacelink.msfc.nasa.gov/Instructional.Materials/Curriculum.Support/Earth
- **DESCRIPTION:** A great source of environmental information on the Internet. There are links to many great sites about El Niño.
- **KEYWORDS:** bibliography, articles, web sites, global, regional, environmental information, topics
- **COMMENTS:** There is a wealth of information about environmental issues that can be accessed via Internet.
- **Reading Level:** Grade 9-12
- **Rating:** 1

FOR FURTHER RESEARCH:

Your supervisor will give you an overview on the use of search engines that will be useful to research the regional consequences of the two phenomena. There is an excellent site that will help them choose an appropriate search engine for their research called NUEVA Library Help. Students should preview the Search Engine Guide at: http://www.nueva.pvt.k12.ca.us/~debbie/library/research/adviceengine.html.

AltaVista, rated as one of the best search engines, has a tutorial on how to search. This tutorial can be activated by clicking the "Help" button or clicking the "Advance Search" then the "help" button. Both these areas should be reviewed before you start to search. The following will give a basic set of helpful resources to get started.

Learning Advice:

Brainstorming:

Before you get started, participate in the consensus building discussion about the general descriptions of the following concepts:

- Weather
- Climate
- Anomaly
- El Niño
- La Nina;a
- Global Warming

With he Task Force Supervisor (your teacher) the following three questions will be brainstormed with the class, to set up the problem, familiarize you with the terminology and introductory background to the phenomena of study. The Task Force Supervisor (teacher) will facilitate, making notes, and introduce you to concept-mapping at the chalkboard. The result should be saved, for reference by your group, to remind you of the various aspects of the problem.

- What do we know?
- What do we need to know?
- Where can we find out what we need to know?

It is important that your work meets the mission outlined in the Memo from D. James Baker, NOAA Administrator, and outlined in the "Process" and "Resources" section. Your use of a variety of information resources, the citation of the resources used, and use of technology for presentation must be observed and documented in your journal.

Time is of the essence (2 weeks of research 1 week of presentations in a 4X4 Block Schedule), so good planning is very important. Before you get started you will need to create a list of the most effective and useful places to do your research. You should start with the suggested resources and build on those. Make a list of the questions to be answered, and kinds of information you will need to answer them. Keep accurate documentation of your sources (parenthetical references and reference lists), so that they can be checked in the event that you are challenged.

Evaluation:

Your grade will be based on these criteria:

- 60pts per group - Oral (Final) Individual Report (20pts each of three students)to the 23 Climate Diagnostics and Prediction Workshop (your teacher and classmates).
- 30pts per group - Written Journal (10pts each of three students) of your personal activities will be evaluated periodically.
- 10pts per group - Daily briefings of anything in the news on your subject will be evaluated as you volunteer to brief the class.

Briefings and Journals:

You will be expected to report your progress in our daily editorial briefings, as well as your daily journal entries, so that we can react to new facts and data that are uncovered. You should all contribute to the project work, and your individual contributions highlighted during the regular briefing sessions and written journals will reflect this individual work. Your partners will read your individual journals and sign that they conquer with your role as a researcher. Regular briefings of the groups by your Research Supervisor (your teacher) will be used to check and guide your progress. Both the research progress and your approach to the problem will be reviewed, making sure that all students are contributing; that they are making use of the resources, and are focused on the solution of the problem.

Final Presentation:

Before the final presentation, both the teacher and students need to identify the criteria for a "good" presentation and research process. The product and the processes, procedures, and efforts should be examined with these criteria in mind. From this list of criteria a rubric for scoring the presentations and research will be developed.

The final report is a 15 minute group presentation including each topic related to a specific phenomena and including 5 minutes for the similarities and differences. Total minutes for each group will be 15 minutes. You are simulating the 23rd Climate Diagnostics and Prediction Workshop (your teacher and class). The report must be an oral presentation with visual aids and concise notes. You may not read the report. You will need to make use of technology to support your research, including resource references, pictures, maps, charts, models, and other acceptable means which reflects serious research has been done. .

Conclusion:

In your journal, answer the question: What similarities and differences can be found between the tree anomalies for each topic. You will get that information by taking notes as each group gives it's presentation.

Reflection:

- In your journal, ask yourself the following questions about the research process and

the presentation that you did for the Research Supervisor.

- What worked and what did not?
- Was time effectively used?
- Were ideas well-presented?
- What could have improved their work?

Teacher Notes
Weather Anomalies

Grade Level/Unit: Grade 9 Geography/Climate and Weather but can be used in 9-12 Earth Science, and 9-12 English/Journalism, 9-12 Business/Pacific Rim

Lesson purpose: Students will be able to answer the question: What are the similarities and differences between the phenomena - El Niño, La Niña, and Global Warming and what regional impact do they have on the world?

Unit Goals:

- Students will be able to explain and discuss the current events of the Climate Phenomena&endash; El Niño, La Niña, Global Warming, what regional impact they have on the world and what similarities and difference the students found between the different phenomena?
- Students will develop the abilities to access, evaluate, and use information from a variety of sources to solve problems and communicate effectively.

Standards:

English/Language Arts

Reading: Students read and understand grade appropriate material. They analyze the organizational patterns arguments and positions advanced.

Writing: Students write coherent and focused texts that convey a well-defined perspective and tightly-reasoned argument... establishing a coherent thesis.

Listening and Speaking: Students formulate adroit judgments about oral communication. They deliver focused and coherent presentations of their own that convey clear and distinct perspectives and solid reasoning.

History/Social Studies

Students explain the relationships between geography and the historical development of the U.S. (and the world) using various map projects, pictures and computer databases.

Students analyze ways humans depend upon, adapt to, and affect the physical environment and the global effects of human modifications of the physical environment.

Science State Framework

That students understand the nature of the physical universe.

That scientific fact be understood as based on confirmable observations and is subject to test and rejection .

Geography National Framework

Standards aim to create a geographically informed person:

- who understands the study of people, places and environments from a spatial perspective
- who appreciates the interdependent worlds in which we live Who sees the practical value of geography through the application of spatial views to life situations.
-

◦ Information Literacy Skills:

◦ The Big Six Skills of Information Problem Solving

Task Definition:

- Define the problem

- Identify the information needed

Information Seeking Strategies:

- Brainstorm all possible sources
- Select the best sources

Location and Access:

- Locate sources (intellectually/physically)
- Find information within sources

Use of Information:

- Engage (e.g., read, hear, view)
- Extract relevant information

Organize information. from multiple sources

- Present the result

Evaluation:

- Judge the result (effectiveness)

Judge the process (efficiency)

Lesson length:

Three weeks during a 4X4 Block Schedule (90 minute periods).

Two weeks for research and one week for presentations (plus outside research by students.)

Resources or Materials Suggested:

The websites listed in the lesson plan will give the students a basic set of helpful resources to get started. You (Teacher) and/or the Library Educational Technology Teacher should give you an overview on the use of search engines that will be useful to research the regional consequences of the two phenomena. Students should preview the Search Engine Guide at: < http://www.nueva.pvt.k12.ca.us/~debbie/library/research/adviceengine.html > to chose the best search engine for your purpose.

AltaVista, rated as one of the best search engines, has a tutorial on how to search. This tutorial can be activated by clicking the "Help" button or clicking the "Advance Search"

then the "help" button. Both these areas should be reviewed before you start to search. The following will give a basic set of helpful resources to get started. Background Information that should be discussed with class:

You, the teacher will elaborate on the following overview to start the lesson:

Weather, Climate, and Anomalies

Weather is the general condition of the atmosphere at a particular time and place, with regard to the temperature, moisture, and other factors. Climate is the long-term patterns of weather in a particular region, including temperatures, rain, snow, and other factors. The word anomaly is anything that departs from the regular pattern, general rule, or usual method. Therefore, day-by-day anomalies are called weather, while climate is the general trend of weather, based on statistical data accumulated over time. Climate is influenced by the sun, by the atmosphere, and by the ways that the atmosphere and the ocean transport heat. For a particular region the elevation, terrain, distance from the ocean latitude, and other factors must also be considered. Humans can also affect climate with air pollution.

El Niño, La Niña and Global Warming.

El Niño:

El Niño, oceanic and atmospheric phenomenon in the Pacific Ocean, during which unusually warm ocean conditions appear along the western coast of Ecuador and Peru, causing climatic disturbances of varying severity. The term originally described the warm southward current that appears in the region every December, but it is now reserved for occurrences that are exceptionally intense and persistent. These occur every three to seven years and can affect climates around the world for more than a year. The name El Niño, Spanish for "the child," refers to the infant Jesus Christ and is applied because the current usually begins during the Christmas season. The climate disturbances caused by El Niño bring heavy rains to South America and can cause droughts in southeastern Asia, India, and southern Africa. It can also bring unusual weather to large parts of the United States. Economic effects of El Niño are felt particularly in coastal Peru and Ecuador. These cold-water zones support large populations of commercially valuable fish, which also provide food for sea birds, whose guano is an important component of the regional fertilizer industry. During El Niño fish and birds die or leave the area. The El Niño event of 1982 and 1983 was the most severe of the 20th century.

La Niña

La Niña is the term used to describe conditions opposite from what is usually called El

Niño. A La Niña is characterized by cooler than normal water in the eastern, tropical Pacific Ocean. A La Niña does not always follow an El Niño; some times conditions are normal.

Global Warming

Global Warming, increase in the earth's temperature, is caused by the buildup of greenhouse gases such as carbon dioxide and methane in the atmosphere. Greenhouse gases prevent infrared radiation from escaping into space, and this greenhouse effect maintains the earth's warm temperature. Increasing levels of greenhouse gases, resulting from industry and the burning of fossil fuels, may result in rising global temperatures, causing coastal flooding and major climatic changes. According to the British Meteorological Office, 1995 was the warmest year on record. A United Nations panel of scientists has predicted that if greenhouse gas emissions are not reduced, the average global temperature could rise by 1° to 3.5° C (1.8°to 6.3° F) by the year 2100.

Lesson Sequence:

Introduction:

You, the teacher will give and read to the students the overview paragraphs about the definitions of weather, climate, anomalies and the three phenomena El Niño, La Niña, and Global Warming. You will tell the class that the mission of this three week lesson is to be able to answer the question: What are the similarities and differences between the phenomena El Niño, La Niña, and Global Warming and what regional impact do they have on the world.

You ask the class to imagine that they are members of a select scientific team from the National Oceanic and Atmospheric Administration (NOAA) which envisions a world in which societal and economic decisions will be strongly coupled to a comprehensive understanding of the environment.

Introduce the problem (assuming the role of Research Supervisor), by reading the Memo, from D. James Baker, NOAA Administrator to the Research Supervisor of the Weather Anomalies Task Force.

Introduction (sample):

"You are a new staff member of the National Oceanic and Atmospheric Administration (NOAA). Your Research Supervisor (me) has called together a Science-Research team, to give a presentation at the 23rd Climate Diagnostics and Prediction Workshop, and you are delighted to find that you are a key member of that team." The project task is described in a memo from D. James Baker, NOAA Administrator given above.

Help Students Define the Task

Brainstorming:

After reading the brief paragraphs describing the several concepts related to this task and reading the memo, the following three questions should be brainstormed with the class, to set up the problem, familiarize students with the terminology and historical background. As Task Force Supervisor, you should facilitate, making notes, concept-mapping at the chalkboard. The result should be saved for reference by the group to remind them of the various aspects of the problem.

- What do we know?
- What do we need to know?
- Where can we find out what we need to know?

Tell students, that their job as members of the scientific team is to locate and examine the selected Internet sites that have to do with the topic of the related phenomenon that they are tasked to present. Research the big picture of your particular phenomenon before you move into your specific topic. Use the three above questions to guide your search.

Tell them that they are expected to produce the highest quality documentation for their work. Explain that they will be using the Internet/World Wide Web (including the online archives of newspapers,) as major resources, as well as other electronic and print resources (books, magazine articles) of our library.

Time is of the essence, so good planning is very important. Before students get started they will need to create a list of the most effective and useful places to do research. Make a list of the questions to be answered, and kinds of information that will be needed to answer them. Keep accurate documentation of sources, so that they can be checked in the event of a challenge.

Assignment into Groups:

Twelve groups of three will describe the phenomena El Nino, La Nina, and Global Warming and there regional affect on the World in 10 to 15 minute presentation. Each group will culminate their presentation with a 5 minute discussion of the similarities and differences the group found between the three phenomena as it pertains to their particular region of the world.

The Group Topics are listed and described in the "The Process" section of the lesson plan. As the supervisor, you will select 12 teams of three scientists (36 select scientists), Each group will have 3 scientists each. Each team will be assigned one of the group topics.

Oral Presentations:

Each group will give an oral presentation making use of technology to support their research, including resource references, pictures, maps, charts, models, and other acceptable means which reflects serious research has been done. The group teams of three scientists can coordinate the time of each individuals report any way they want (subject to the teachers approval). The class as a whole will be taking notes for their individual journal answers to the main question: What similarities and or differences can be found between the three phenomena El Niño, El Niña, and Global Warming and their regional consequences.

Due to the complexity of events related to the the three climate phenomena, groups will focus on various aspects of the problem. One will zero in on the question: How does the normal Weather work? Another group will take on the anomalies, what is El Niño, La Niña and what is Global Warming. The rest of the groups will look at the regional consequences of each phenomena. Each group of three will answer the big question for their particular region of the world. This approach is recommended, since each group will contribute something special to the total learning experience, and allow them to teach each other, while the teacher guides and coaches from the side. How you select the groups is up to you the supervisor of the task force.

Briefings:

Students will be expected to report their progress in their daily editorial briefings, as well as their daily journal entries, so that the rest of the class can react to new facts and data that are uncovered. Students should contribute to the project work, and each individual contribution should be highlighted during the regular briefing sessions and written journals will reflect this individual work. Partners will read individual journals and sign that they conquer with their partners role as a researcher. Regular briefings of the groups to your Research Supervisor (your teacher) will be used to check and guide your progress. Both the research progress and your approach to the problem will be reviewed, making sure that all students are contributing; that they are making use of the resources, and are focused on the solution of the problem.

Product and Evaluation:

The final product will consist of a group oral presentation with visual aids, the demonstrated research process and the individual journal with the individual answer to the major mission question. They will need to make use of technology to support their research, including resource references, pictures, maps, charts, models, and other acceptable means which reflects serious research has been done.

Student grades will be based on these criteria:

- 60pts per group - Oral (Final) Individual Report (20pts each of three students)to the 23 Climate Diagnostics and Prediction Workshop (your teacher and classmates).
- 30pts per group - Written Journal (10pts each of three students) of your personal

activities will be evaluated periodically.
- 10pts per group - Daily briefings of anything in the news on your subject will be evaluated as you volunteer to brief the class.

Before the final presentation, both the teacher and students need to identify the criteria for a "good" presentation and research process. The product and the processes, procedures, and efforts should be examined with these criteria in mind. From this list of criteria a rubric for scoring the presentations and research will be developed.

The final group report is a 10 minute group presentation for each topic related to a specific phenomena and 5 minutes for the similarities and differences. Total Minutes for each group will be 15 minutes. Students will simulate that they are presenting to the 23rd Climate Diagnostics and Prediction Workshop (teacher and class). The report must be an oral presentation with visual aids and concise notes. Students may not read the report. They will need to make use of technology to support their research, including resource references, pictures, maps, charts, models, and other acceptable means which reflects serious research has been done.

Conclusion:

In their student journals , each individual, should answer the question: What similarities and differences can be found between the two phenomena El Nino, La Nina, and Global Warming for each region of the world. Students will get that information by taking notes as each group gives it's presentation.

Reflection:

In student journals, students should ask themselves the following questions about the research process and the presentation that they did for the Research Supervisor.

- What worked and what didn't?
- Was time effectively used?
- Were ideas well-presented?
- What could have improved their work?

Credits:

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